CONTROLS ON FRACTURE DISTRIBUTION IN THE GIDDINGS AUSTIN CHALK

Duane T. Wagner[1]

ABSTRACT

Fracture distribution in the Giddings Austin Chalk is controlled by both structure and the stratigraphy of the Austin Group. Parameters which most affect reservoir performance include fracture width, height, and spacing, as well as the number of fracture sets and their orientations. Lateral variance of these parameters is a function of structural position, while vertical change is related to stratigraphy.

The Austin Chalk productive trend is thought to coincide with the hingeline of the Gulf Coast Basin, where extension has been concentrated during subsidence of the basin. Fracturing is attributed to a number of mechanisms including normal faulting, bending over buried structures, gravity creep, differential compaction, and aquathermal pressuring. A change in structural style from faulting to flexure takes place from west to east across the Giddings Field, accompanied by a change in fracture distribution. In the west, fractures develop only in close proximity to faults whereas in the east they are more widely distributed over broad warps.

Stratigraphic controls include lithology, porosity, bed thickness, and ductility contrast between adjacent beds. The Austin Chalk consists of sparse biomicrite interbedded with marls, shales and clay seams. In general, thin beds are more highly fractured than marl or shale. Where the more ductile marls and clays exceed a critical thickness, fractures tend to terminate within individual chalk beds, resulting in barriers to vertical flow within the reservoir.

[1] Texas A&M University